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# DataFlowSystemfortheVLTI





# The concept of DataFlow

Observation Preparation

Observation Preparation Tools

Phase I/Phase II preparation

Execution

Templates & OBs  
P2PP & BOB

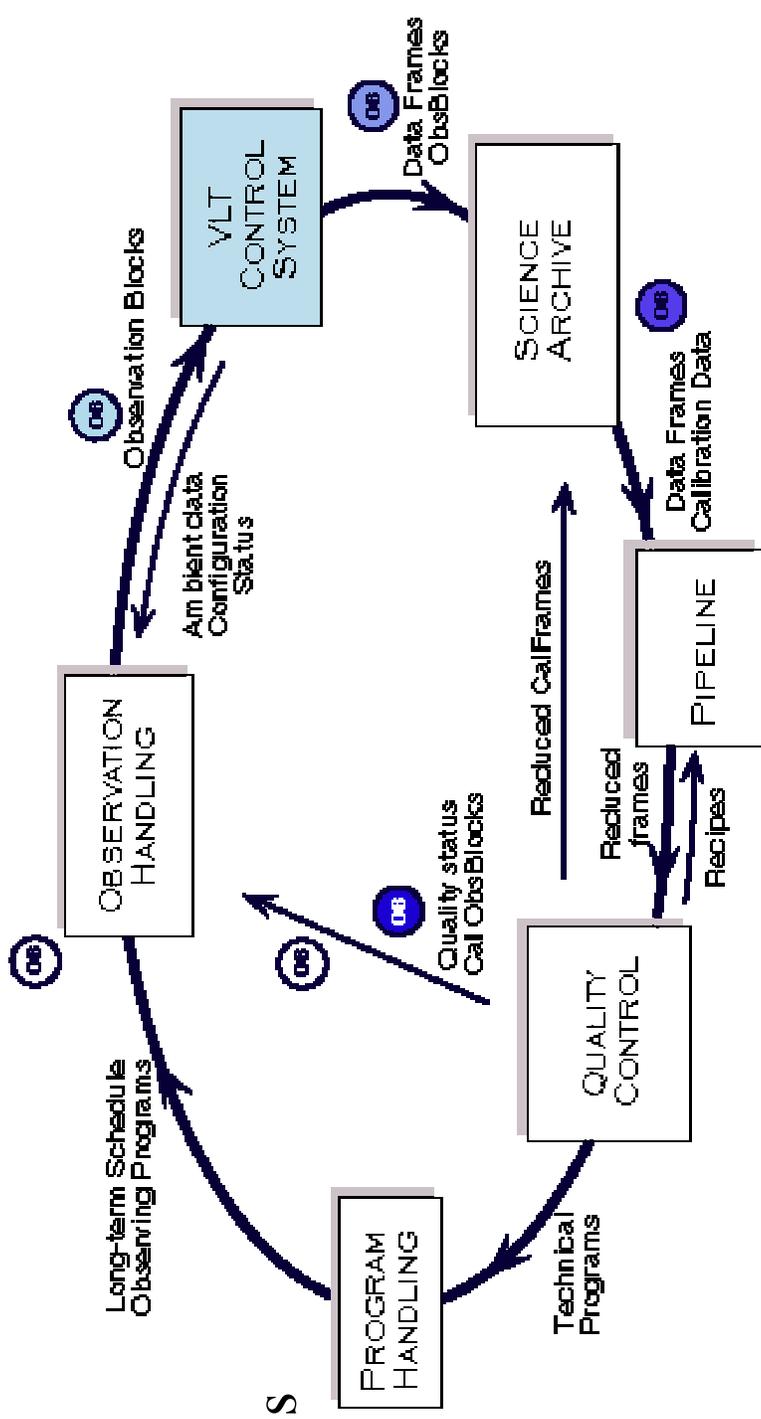
Archiving

Processing

Pipeline

Quality control

Offline analysis

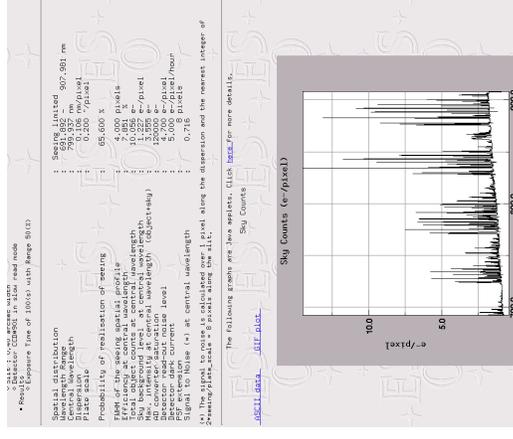
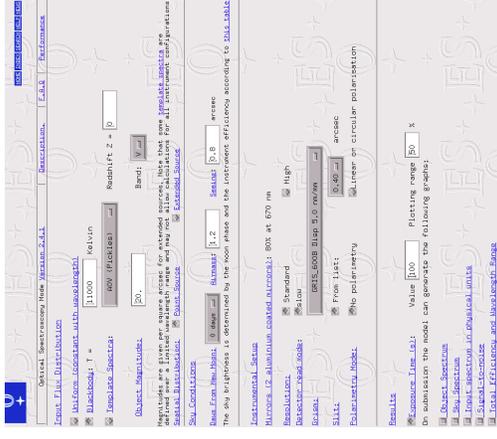


- **UserSupportGroup(Garching)**
  - CallforProposals
  - PhaseIandPhaseII support
  - UserSupportAstronomers
  - P2PP,ETCs,SpecificTools
- **ScienceOperationsParanal(Paranal)**
  - Nightastronomer
  - Operators
  - Archiveoperators
  - CalibrationPlan
- **DataFlowOperations(Garching)**
  - QualityControlLevel0
  - QualityControlLevel1
  - DataPacker

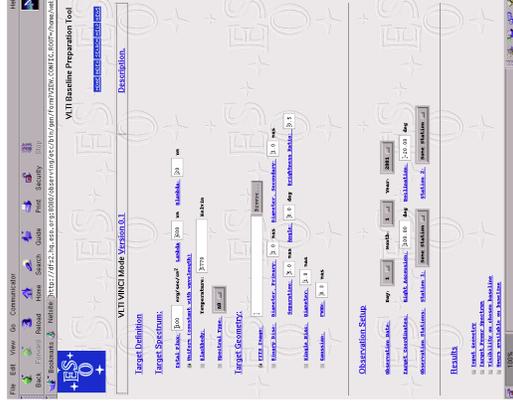
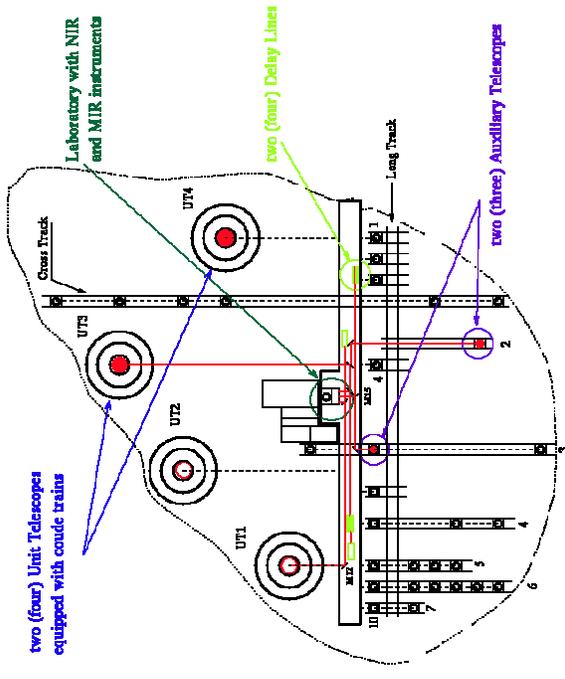
- **VINCI** (VLT Interferometer Commissioning Instrument, 2001)
  - Test instrument for first light
  - Operating wavelength 2.2 microns
  - Proven technology (FLUOR on IOTA)
  - Fiducial point
- **MIDI** (Mid-infrared Interferometric Instrument, 2002)
  - Mid-IR instrument (10-20 microns)
  - Two beam design
  - Challenges: Signal detection, Data rates (2.3 MB/sec)
- **AMBER** (Astronomical Multi-Beam Recombiner, 2002)
  - Near-IR instrument (1-2.5 microns)
  - Three beam design
- **PRIMA** (Phase-Referenced Imaging and Microsecond Astrometry)
  - VLT Dual-Feed facility (two objects in the field)
  - Astrometry with 10 microarcsecond accuracy

- Exposure Time Calculators
- Uniform presentation and Web access
- 25 instrument modes currently supported
- Sharp usage peak during the CFPs
- Efficient development & maintenance
- Database

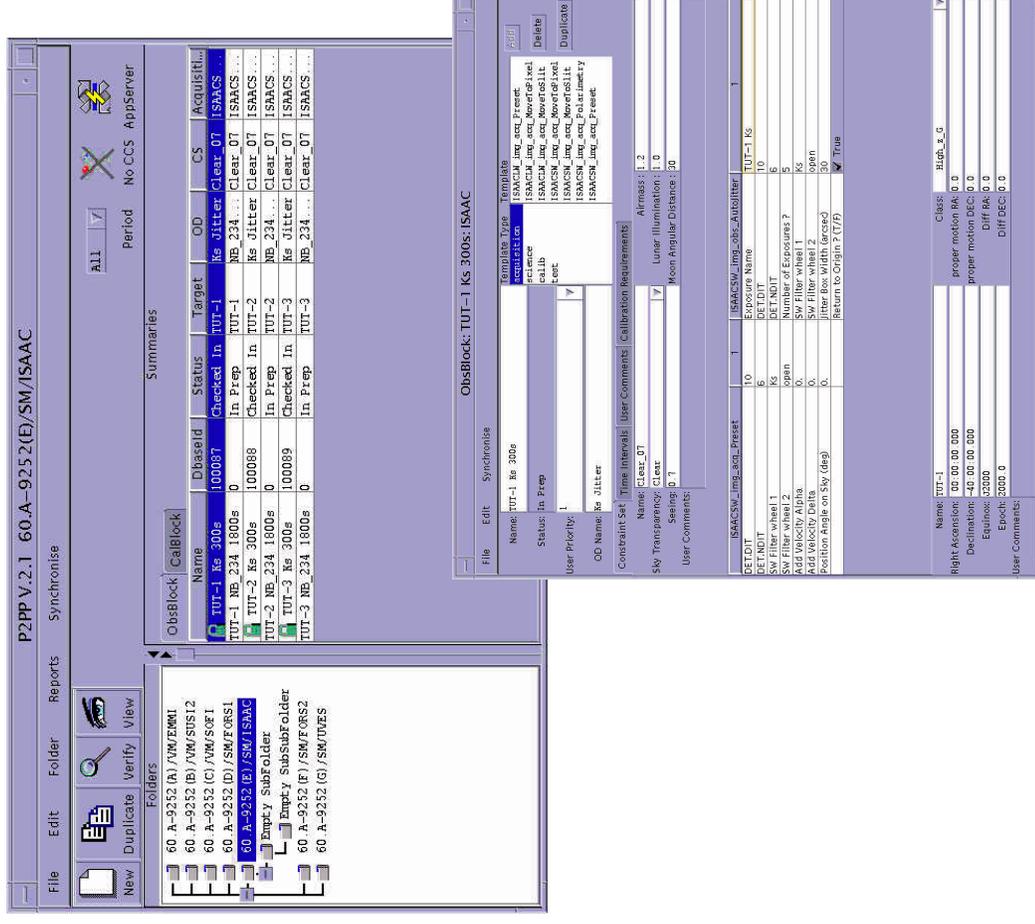
- Instrument Description File
- Component characteristic data
- HTML Templates
  - C++ library and applications
  - Keyword definition and parsing
  - External Interfaces
  - Scripting language



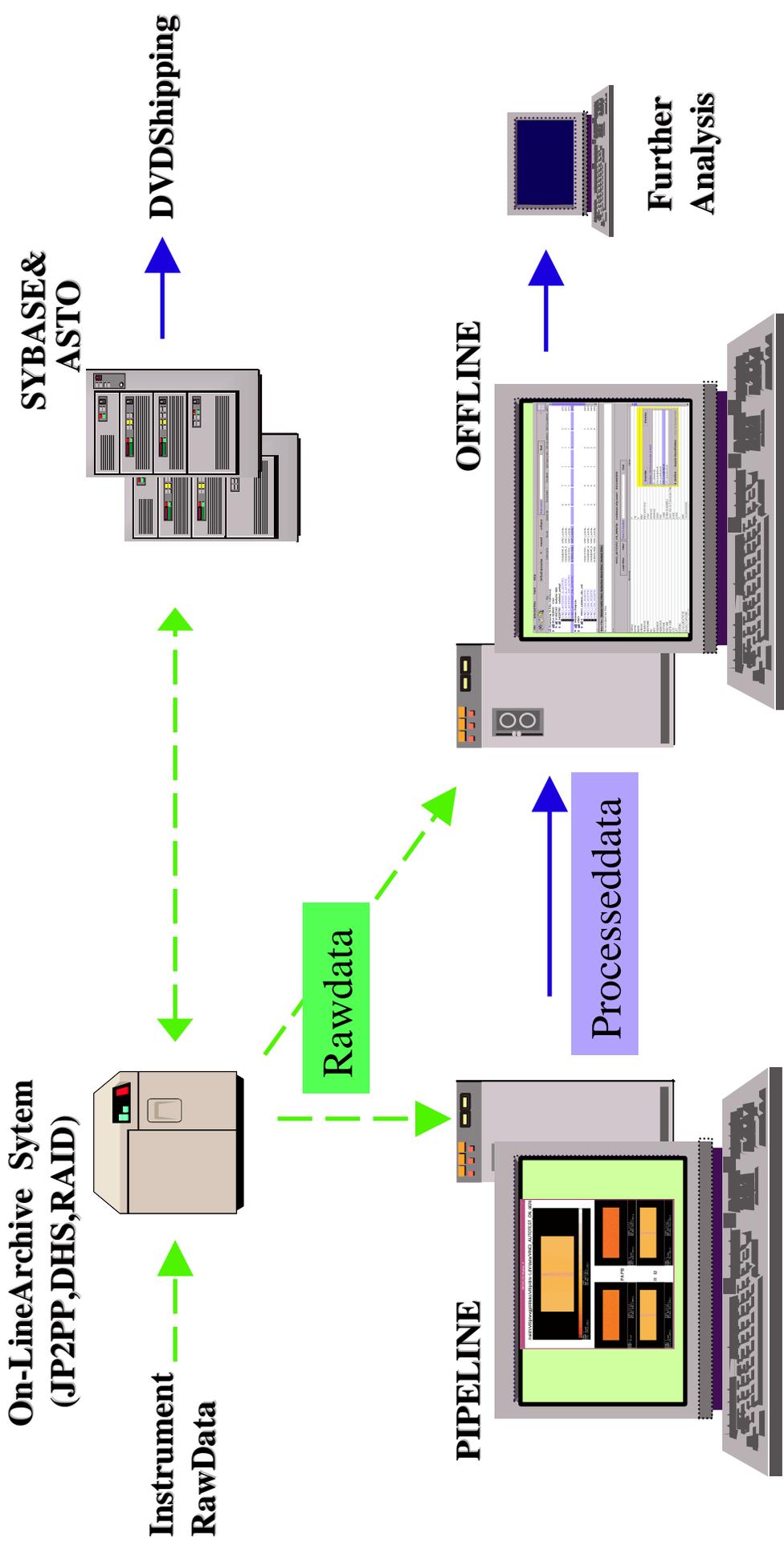
- **Visibility Calculator**
  - VLTISimulator
  - Parameters: Brightnessmap, Coordinates,...
  - Stations, Delaylines, shadows, ranges
  - Range of observation, Visibility
  - Verify observability
  - Technical feasibility of the observation
- **Scheduling Assistant**
  - Sorting observation blocks
  - Delay line range



- Standard interface to all instruments, operational since 1998
- **Observation Templates**
  - Instrument Summary File
  - Template Signature File
- **Observation Blocks**
  - General information
  - Target package
  - Acquisition template
  - Science & calibration templates
  - Constraint set (SMonly)
  - Timing interval (SMonly)
- **For the VLTI**
  - **More than 1 target per OB!**
  - New methods in evaluation
  - **OB External Verification Modules**



The screenshot displays the P2PP V.2.1 software interface for the 60 A-9252 (E)/SM/ISAAC instrument. The main window shows a list of observation blocks (TUT-1 to TUT-3) with columns for Name, DbaseId, Status, Target, OD, and Acquisition. A detailed view of the 'ObsBlock: TUT-1 - Ks 300s: ISAAC' is shown on the right, including fields for Name, Status, User Priority, and various calibration requirements like Sky Transparency, Seeing, and Moon Angular Distance. A table at the bottom lists parameters such as DET, SW Filter when 1, SW Filter when 2, and Position Angle on Sky.





# VLTI DFSatParanal( cont'd)

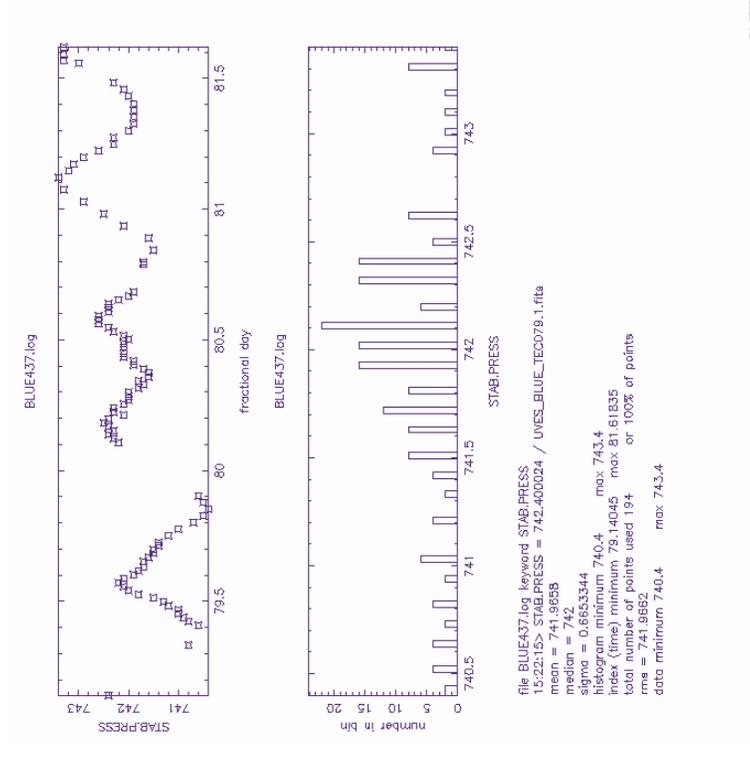
<b>Machine</b>	<b>wvgdhs</b>	<b>wvgpl</b>	<b>wvgoff</b>	<b>wvgsyb</b>	<b>wvgarc</b>
<b>WSmodel</b>	HP J5600, 1024MBRAM, 2x9GBint. disks, ATMnetwork card, CD-ROM				
<b>Disks</b>	MTIRAIID (120GB, max. 16x18GB)	2x73GB	2x73GB	4x18GB	2x73GB 1x73GB 1x18GB
<b>Media</b>	DAT	N/A	DAT	DLT	2xCD-R/RW, 1DVD recorder



- **Data Interface Control Dictionary**
  - FITS and DICD compliance
  - Keywords repository, software, Data Interface Control Board
- **Data Structures for Interferometry**
  - FITS Binary Tables
  - IAU Interferometry Working Group
- **VLTI FITS files**
  - Size: 1-100MB, Rate: 1 FITS file every few seconds to hours
  - Currently UT1 + UT2 produce of the order of 10GB/night
  - VLTI/MIDI: 2.3MB/sec, beyond 2GB file size, 40GB per night
- **Current developments**
  - UVES observing run in May 2001 (1MB/s during 2 days, 40GB per night)
  - Bottleneck: DVD writing
  - New Generation Archive System in test phase on 2p2WFI
    - Linux architecture
    - Magnetic disks storage



- Procedures to verify instrumental and observational conditions
  - Instrument performance
    - detector, calibration units, flexures and drifts
  - Observational conditions
    - sky background, atm. statistics
  - Routine and special technical programs
- VLT IQC parameters
  - Coherence factors
  - Catalog of observations
- Operation logs





- VLTObservations and generic FITS browser
- Interactive front-end
  - Pipeline procedures
  - Pipeline post-processing
  - Angular measurements
  - Analysis
  - Commissioning tools
- Public release
  - Java language
  - FITS format
  - User-defined shell scripts
- Other tools
  - IDL Analysis
  - MATLAB

The screenshot displays the FITS browser interface. The top panel shows a file list with columns for file name, DBF.CATG., TPLID., ORIGFILE., TPLEXPNO., and RBS.DD. The middle panel shows a list of files with their respective FITS headers. The bottom panel shows a table of FITS header keywords and their values.

Keyword	Value
SIMPLE	T
BITPIX	16
NAXIS	0
ORIGIN	ESO
TELESCOP	ESO-VLT-S12
INSTRUME	vincl
RA	10.000000
DEC	0.000000
EQUINOX	2000
WORLDWID	T
SYSTEM	1.048
MID-OBS	51961.91828521
DATE-OBS	2001-02-21T22:20:20.706
UTC	0.000
LIST	0.000
EXTEND	T
COUGUID:STATUS	UNK
DELDT1:OPLEND	10.0000000000



- **A milestone towards large data volume instruments**
  - Networks and archives in preparation
  - Bottleneck in data processing?
- **Reinforced need for highly integrated end-to-end tools**
  - Observation preparation
- **Evolving DFS paradigms**
  - Links between observations
  - Data structures for interferometry
- **Interferometry in the operations stream**
  - VLT standards
  - Service mode

- **Data Formats**
  - Pipeline processed data
- **Software**
  - Observation Preparation Tools
  - OPTICON Thematic Network
    - Archive, Interoperability, Infrastructure
    - Interferometric Software Workshop
- **Imaging and Astrometry**
  - A driver for the VLTI
  - Long term (2/3 years)
- **The future**
  - Service Observing mode for the VLTI
  - ALMA